

## WHAT IS CLAIMED IS:

1. A method for forming a shallow trench isolation, the method comprising:

i) forming a pad oxide layer on a semiconductor substrate;

ii) forming a first stopping layer on the pad oxide layer;

iii) forming a second stopping layer on the first stopping layer;

iv) etching the second stopping layer, the first stopping layer, the pad oxide layer and the semiconductor substrate to thereby form a second stopping layer pattern, a first stopping layer pattern, a pad oxide layer pattern and a trench;

v) forming a trench inner surface oxide layer at an inner surface portion of the trench;

vi) forming a nitride layer liner on a resulting structure;

vii) forming a field oxide layer in the trench;

viii) selectively removing the second stopping layer pattern thereby exposing the first stopping layer pattern; and

ix) removing the first stopping layer pattern.

2. The method as claimed in claim 1, wherein the first stopping layer comprises nitride.

3. The method as claimed in claim 1, wherein the second stopping layer comprises a material having a selectivity to a gap filling oxide layer which fills up the trench for forming the field oxide layer in a chemical mechanical polishing process so that an etching rate ratio of the gap filling oxide layer with respect to second stopping layer is no

less than about 10:1.

4. The method as claimed in claim 3, wherein the second stopping layer comprises at least one of silicon oxynitride (SiON) and polysilicon.

5

5. The method as claimed in claim 1, wherein the second stopping layer pattern is removed by performing a dry etching process.

6. The method as claimed in claim 1, wherein the second stopping layer pattern is removed by performing a wet etching process using a chemical having a selectivity more than 10:1 between the second and first stopping layers.

7. The method as claimed in claim 6, wherein, when the second stopping layer includes silicon oxynitride, the second stopping layer pattern is selectively removed by using a mixture including H<sub>2</sub>O<sub>2</sub>, HF, and deionized water.

8. The method as claimed in claim 6, wherein, when the second stopping layer includes polysilicon, the second stopping layer pattern is selectively removed by using a polysilicon etchant.

20

9. The method as claimed in claim 1, wherein the first stopping layer pattern is removed by performing a wet etching process.

10. The method as claimed in claim 1, wherein step vii) comprises the substeps of forming a gap filling oxide layer to fill the trench and removing the gap filling oxide layer until a surface of the second stopping layer pattern is exposed by performing a chemical mechanical polishing process.

5

11. A method for forming a shallow trench isolation, the method comprising the steps of:

- i) forming a pad oxide layer on a semiconductor substrate;
- ii) forming a first stopping layer on the pad oxide layer;
- iii) forming a second stopping layer on the first stopping layer, the second stopping layer including a material having a selectivity to a material forming the first stopping layer with respect to a predetermined etching process;
- iv) etching the second stopping layer, the first stopping layer, the pad oxide layer and the semiconductor substrate thereby forming a second stopping layer pattern, a first stopping layer pattern, a pad oxide layer pattern and a trench;
- v) forming a trench inner wall oxide layer at an inner surface portion of the trench;
- vi) forming a nitride layer liner on a resulting structure;
- vii) forming a gap filling oxide layer to fill the trench;
- viii) removing the gap filling oxide layer until a surface of the second stopping layer pattern is exposed by performing a chemical mechanical polishing process;
- ix) selectively removing the second stopping layer pattern thereby exposing the first stopping layer pattern; and
- x) removing the first stopping layer pattern.

20

12. The method as claimed in claim 11, wherein the first stopping layer includes nitride, and the second stopping layer includes at least one of silicon oxynitride (SiON) and polysilicon.

5 13. The method as claimed in claim 11, wherein the second stopping layer comprises a material having a selectivity to a gap filling oxide layer which fills up the trench for forming the field oxide layer in a chemical mechanical polishing process so that an etching rate ratio of the gap filling oxide layer with respect to second stopping layer is no less than about 10:1.

14. The method as claimed in claim 11, wherein the second stopping layer pattern is removed by performing a dry etching process.

15. The method as claimed in claim 11, wherein the second stopping layer pattern is removed by performing a wet etching process using a chemical having a selectivity more than 10:1 between the second and first stopping layers.

16. The method as claimed in claim 15, wherein, when the second stopping layer includes silicon oxynitride, the second stopping layer pattern is selectively removed  
20 by using a mixture including H<sub>2</sub>O<sub>2</sub>, HF, and deionized water.

17. The method as claimed in claim 15, wherein, when the second stopping layer includes polysilicon, the second stopping layer pattern is selectively removed by using a polysilicon etchant.

18. The method as claimed in claim 11, wherein the first stopping layer pattern is removed by performing a wet etching process.

2024-03-27 14:00:00